



YOUSHANG SEMICONDUCTOR

**设计研发新型功率器件**

**各类小信号开关**

**中低压及高压大电流等场效应管**

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## Features

- $BV_{CE0} > -50V$
- $I_C = -3A$  High Continuous Collector Current
- $I_{CM}$  up to  $-5A$  Peak Pulse Current
- 2W Power Dissipation
- Low Saturation Voltage  $V_{CE(sat)} < -180mV @ 1A$
- $R_{CE(sat)} = 67m\Omega @ 2A$  for a Low Equivalent On-Resistance

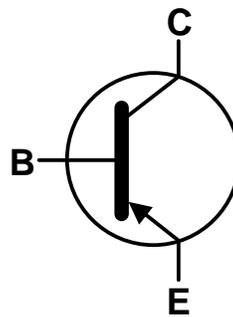
## Mechanical Data

- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound  
UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per  
MIL-STD-202, Method 208 (3)
- Weight: 0.052 grams (Approximate)

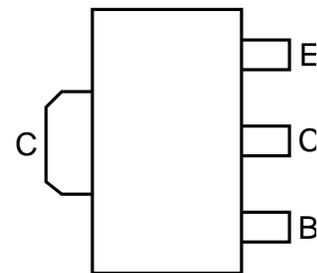


Top View

SOT89



Device Symbol



Top View  
Pin-Out

**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-50	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-50	V
Emitter-Base Voltage	V <sub>EBO</sub>	-6	V
Continuous Collector Current	I <sub>C</sub>	-3	A
Peak Pulse Current	I <sub>CM</sub>	-5	A
Base Current	I <sub>B</sub>	-500	mA

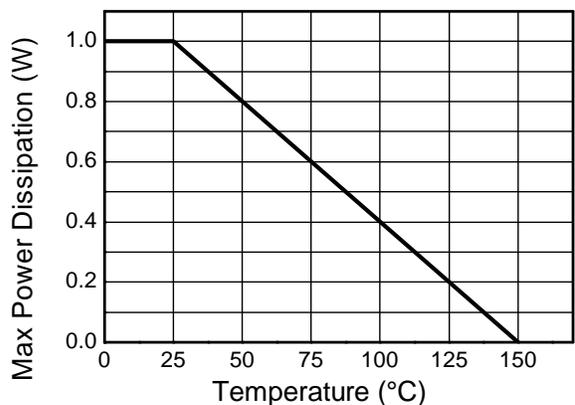
**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 5)	1
		(Note 6)	1.6
		(Note 7)	2.0
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	(Note 5)	125
		(Note 6)	78
		(Note 7)	62.5
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	5.7	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

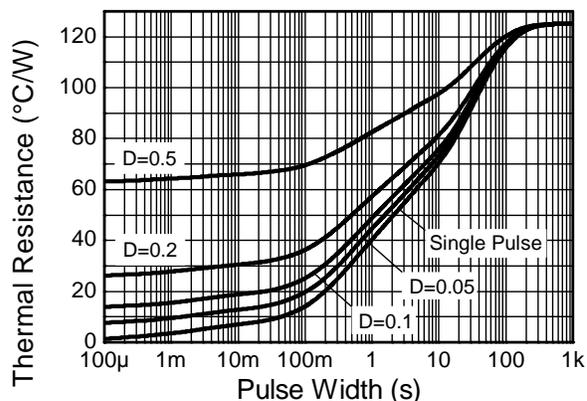
**ESD Ratings** (Note 9)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

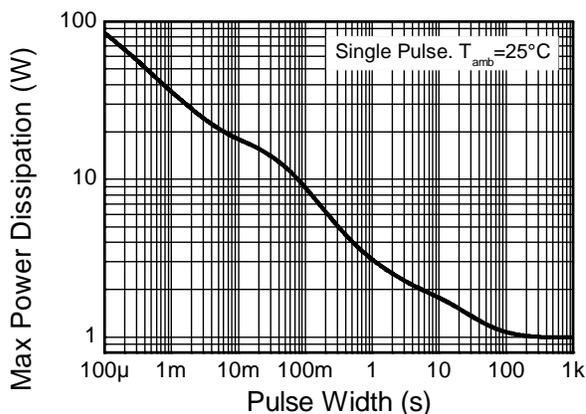
- Notes:
- For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  - Same as note (5), except the device is mounted on 25mm x 25mm 1oz copper.
  - Same as note (5), except the device is mounted on 50mm x 50mm 1oz copper.
  - Thermal resistance from junction to solder-point (on the exposed collector pad).
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.



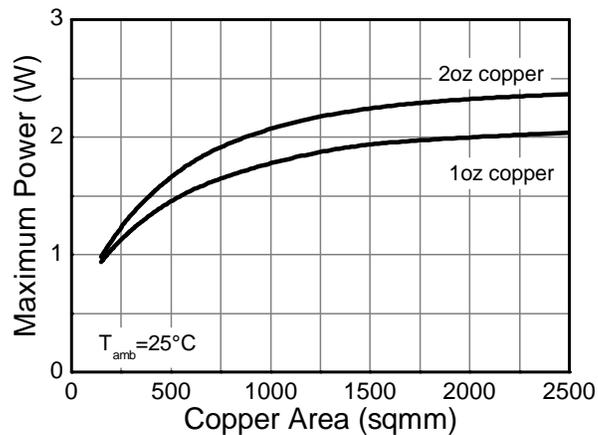
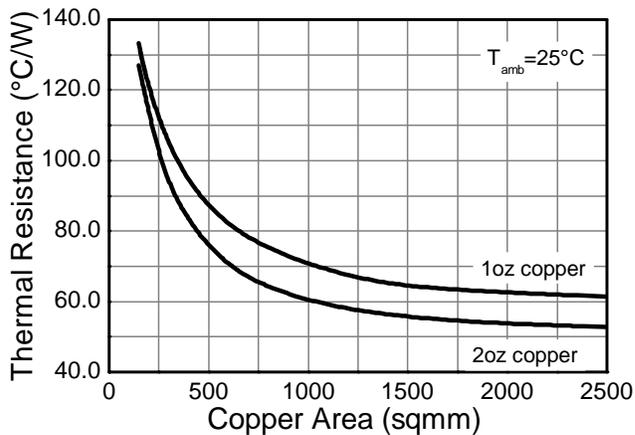
**Derating Curve**



**Transient Thermal Impedance**



**Pulse Power Dissipation**



**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	-50	—	—	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage (Note 10)	BV <sub>CEO</sub>	-50	—	—	V	I <sub>C</sub> = -10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-6	—	—	V	I <sub>E</sub> = -100μA
Collector-Emitter Cut-off Current	I <sub>CES</sub>	—	—	-100	nA	V <sub>CE</sub> = -50V
Collector Cut-off Current	I <sub>CBO</sub>	—	—	-100	nA	V <sub>CB</sub> = -50V
				-50	μA	V <sub>CB</sub> = -50V, T <sub>A</sub> = +150°C
Emitter Cut-off Current	I <sub>EBO</sub>	—	—	-100	nA	V <sub>EB</sub> = -5V
Static Forward Current Transfer Ratio (Note 10)	h <sub>FE</sub>	—	—	200	—	I <sub>C</sub> = -100mA, V <sub>CE</sub> = -2V
				200		I <sub>C</sub> = -500mA, V <sub>CE</sub> = -2V
				200		I <sub>C</sub> = -1A, V <sub>CE</sub> = -2V
				130		I <sub>C</sub> = -2A, V <sub>CE</sub> = -2V
				80		I <sub>C</sub> = -3A, V <sub>CE</sub> = -2V
Collector-Emitter Saturation Voltage (Note 10)	V <sub>CE(sat)</sub>	—	—	-90	mV	I <sub>C</sub> = -500mA, I <sub>B</sub> = -50mA
				-180		I <sub>C</sub> = -1A, I <sub>B</sub> = -50mA
				-320		I <sub>C</sub> = -2A, I <sub>B</sub> = -100mA
				-270		I <sub>C</sub> = -2A, I <sub>B</sub> = -200mA
				-390		I <sub>C</sub> = -3A, I <sub>B</sub> = -300mA
Equivalent On-Resistance	R <sub>CE(sat)</sub>	—	67	135	mΩ	I <sub>C</sub> = -2A, I <sub>B</sub> = -200mA
Base-Emitter Saturation Voltage (Note 10)	V <sub>BE(sat)</sub>	—	—	-1.1	V	I <sub>C</sub> = -2A, I <sub>B</sub> = -100mA
				-1.2		I <sub>C</sub> = -3A, I <sub>B</sub> = -300mA
Base-Emitter Turn-On Current (Note 10)	V <sub>BE(on)</sub>	—	—	-1.1	V	I <sub>C</sub> = -1A, V <sub>CE</sub> = -2V
Transition Frequency	f <sub>T</sub>	100	—	—	MHz	I <sub>C</sub> = -100mA, V <sub>CE</sub> = -5V, f = 100MHz
Collector Output Capacitance	C <sub>obo</sub>	—	—	35	pF	V <sub>CB</sub> = -10V, I <sub>E</sub> = 0, f = 1MHz
Turn-On Time	t <sub>(ON)</sub>	—	87	—	ns	V <sub>CC</sub> = -30V, I <sub>CC</sub> = 150mA I <sub>B1</sub> = - I <sub>B2</sub> = 15mA
Delay Time	t <sub>D</sub>	—	41	—	ns	
Rise Time	t <sub>R</sub>	—	46	—	ns	
Turn-Off Time	t <sub>(OFF)</sub>	—	294	—	ns	
Storage Time	t <sub>S</sub>	—	250	—	ns	
Fall Time	t <sub>F</sub>	—	44	—	ns	

Note: 10. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

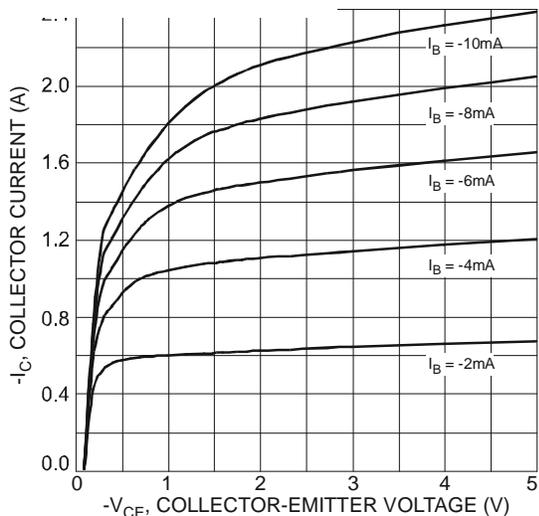


Figure 1 Typical Collector Current vs. Collector-Emitter Voltage

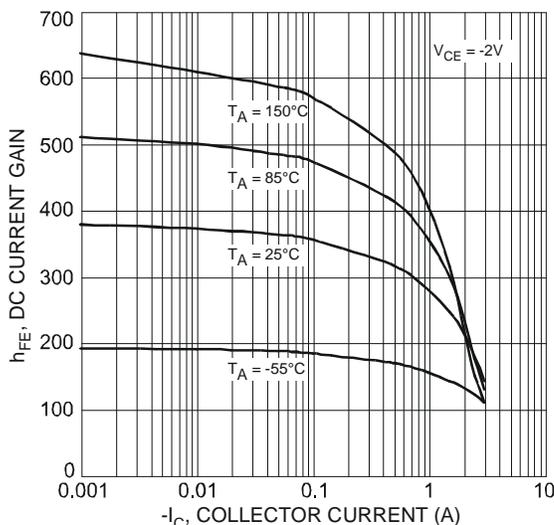


Figure 2 Typical DC Current Gain vs. Collector Current

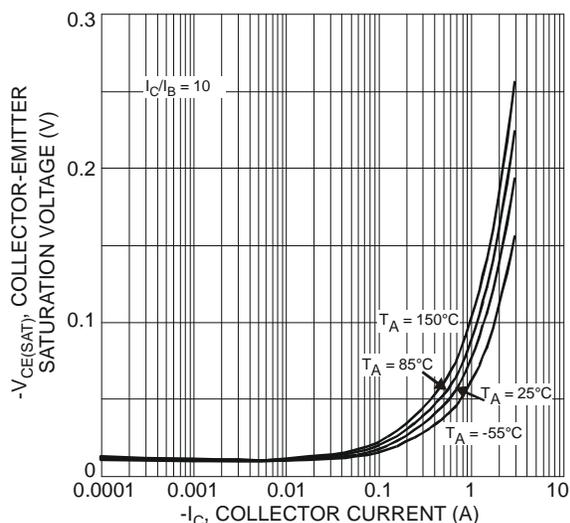


Figure 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current

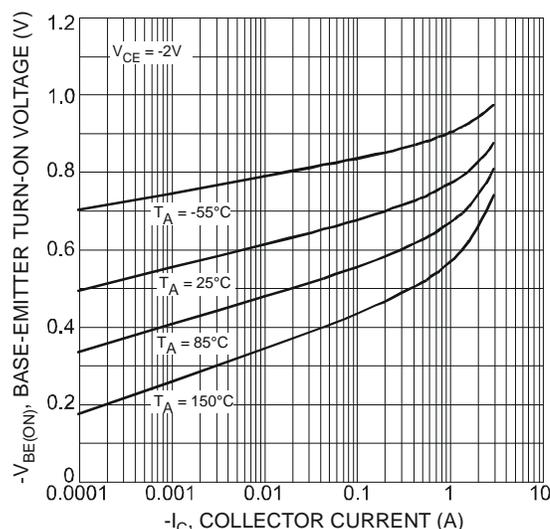


Figure 4 Typical Base-Emitter Turn-On Voltage vs. Collector Current

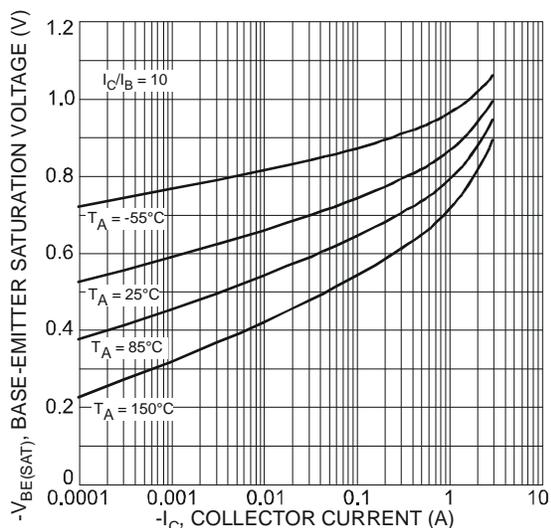


Figure 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

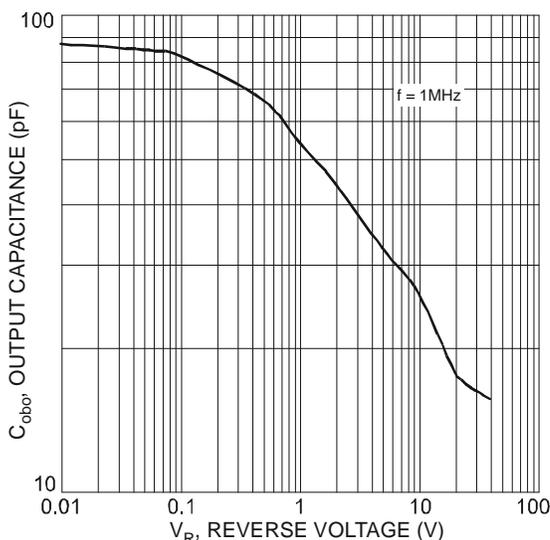


Figure 6 Typical Output Capacitance Characteristics

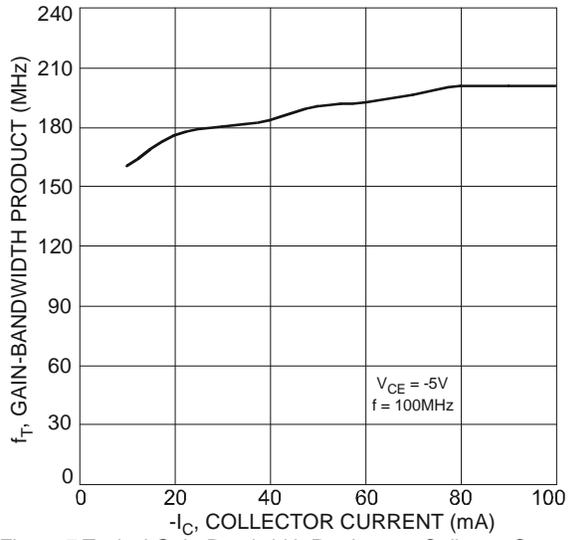
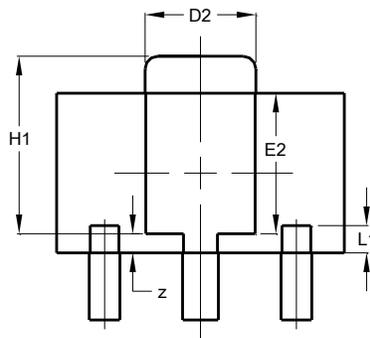
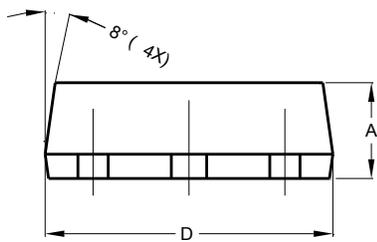
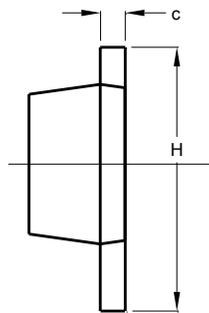
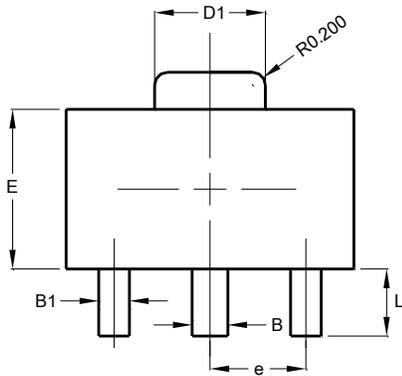


Figure 7 Typical Gain-Bandwidth Product vs. Collector Current

### Package Outline Dimensions

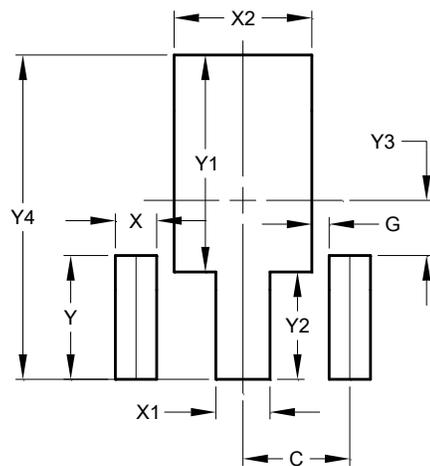
SOT89



SOT89			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in mm			

### Suggested Pad Layout

SOT89



Dimensions	Value (in mm)
C	1.500
G	0.244
X	0.580
X1	0.760
X2	1.933
Y	1.730
Y1	3.030
Y2	1.500
Y3	0.770
Y4	4.530